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UNITED STATES DEPARTMENT OF AGRICULTURE  
Agricultural Research Administration  
Bureau of Entomology and Plant Quarantine

A  
A DUSTER FOR LABORATORY EXPERIMENTS WITH INSECTICIDES

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The apparatus shown in figure 1,A, was designed to apply small weighed charges of dusts evenly to plants and leaves in laboratory experiments with insecticides and for use in dusting the pea aphid under controlled temperature and humidity conditions while in a natural or undisturbed condition on the plants. The duster (fig. 1,A) consisted of a bell jar, an electric mixer with a variable speed transmission, and the specially constructed parts shown in figure 1,B and C. The funnel, or hopper (fig. 1,B), was attached rigidly to the frame of the mixer, and the shaft (fig. 1,C) was mounted in a chuck on the vertical drive shaft of the motor so that the metal disc would spin freely in close contact with the lower edge of the funnel. The duster operated by driving a dust charge from the hopper by centrifugal force through a slight clearance space between the revolving disc and the lower edge of the funnel, where it was finely dispersed under the bell jar and swirled about the plant and among the leaves by the action of a small fan.

The base for mounting the motor was made by sawing a short 2" by 4" piece of lumber in half longitudinally and fitting and bolting the two pieces of wood tightly together around the neck of the bell jar. The motor was placed over a pad of sponge rubber to prevent excessive vibration and was held in place by bands cut from the inner tube of an automobile tire. The funnel, or hopper (fig. 1,B), was made from a bakelite spark plug cover by cutting out the closed end and was cemented inside a metal collar and attached to the frame of the mixer by small metal brackets. The shaft (fig. 1,C) was made by machining and cutting threads on a short piece of brazing rod. The disc was made of sheet copper about 0.04 inch in thickness. The fan was constructed from a disc of the same material by cutting in from the edge toward the center at 45-degree intervals and twisting the sections at a 45-degree angle with the original plane. The disc and fan were mounted in the desired position on the shaft by means of thin lock nuts. Rubber washers were used on each side of the disc to give some flexibility in its mounting on the shaft. When the shaft was fastened in the chuck of the mixer, emery powder was used to grind the lower edge of the funnel smoothly in the same plane as that of the disc so that the latter part would revolve freely in close contact with the hopper. To prevent dust from collecting in the neck of the bell jar,



this space was closed off by a gasket of cork or sponge rubber fitted around the lower part of the funnel (fig. 1,A). Tufts from a camel's-hair brush were cemented to the lower side of the disc to sweep the opposite surface of the glass and prevent dust from collecting at this point as it was thrown from the lower edge of the dust hopper.

The speed of the disc and fan was regulated near the maximum rate of 3,500 r.p.m. by raising the horizontal wheel of the transmission to a level near the outer edge of the vertical wheel (fig. 1,A). The rate of distribution of the dust was controlled by moving the adjustment screw very slightly to regulate the amount of clearance space between the disc and lower edge of the dust hopper.

In use the duster was placed over an infested plant, and a weighed charge, usually of 50 or 100 mg. of dust, was transferred to the hopper and brushed cleanly to the bottom with a small camel's-hair brush. With the aid of a stop watch and an interval timer the duster was operated for 30 seconds to distribute the dust and then was left in position for an additional period of 3 minutes to permit most of the dust to settle down.

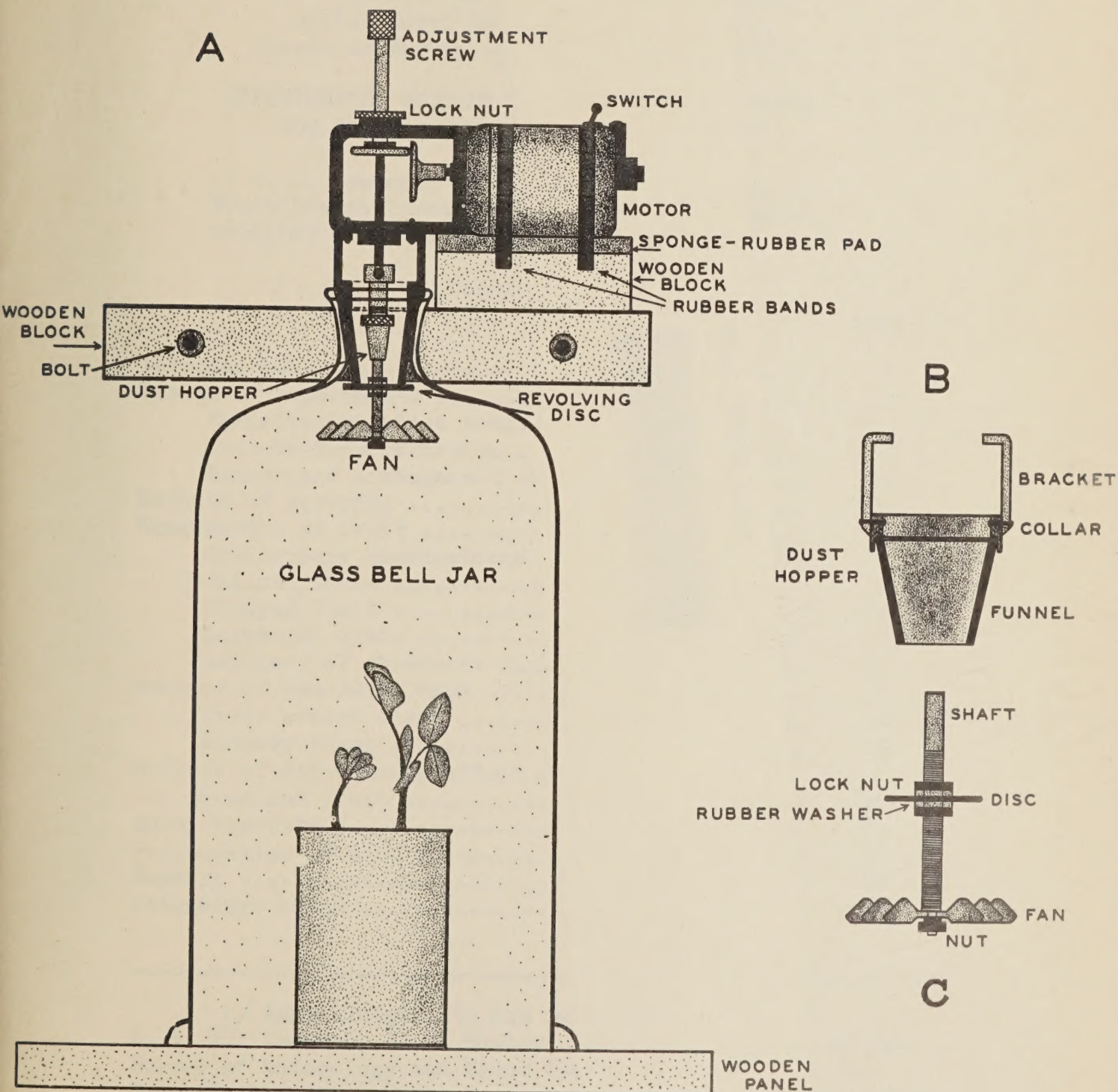


Figure 1.--Diagram of duster showing details of construction.



